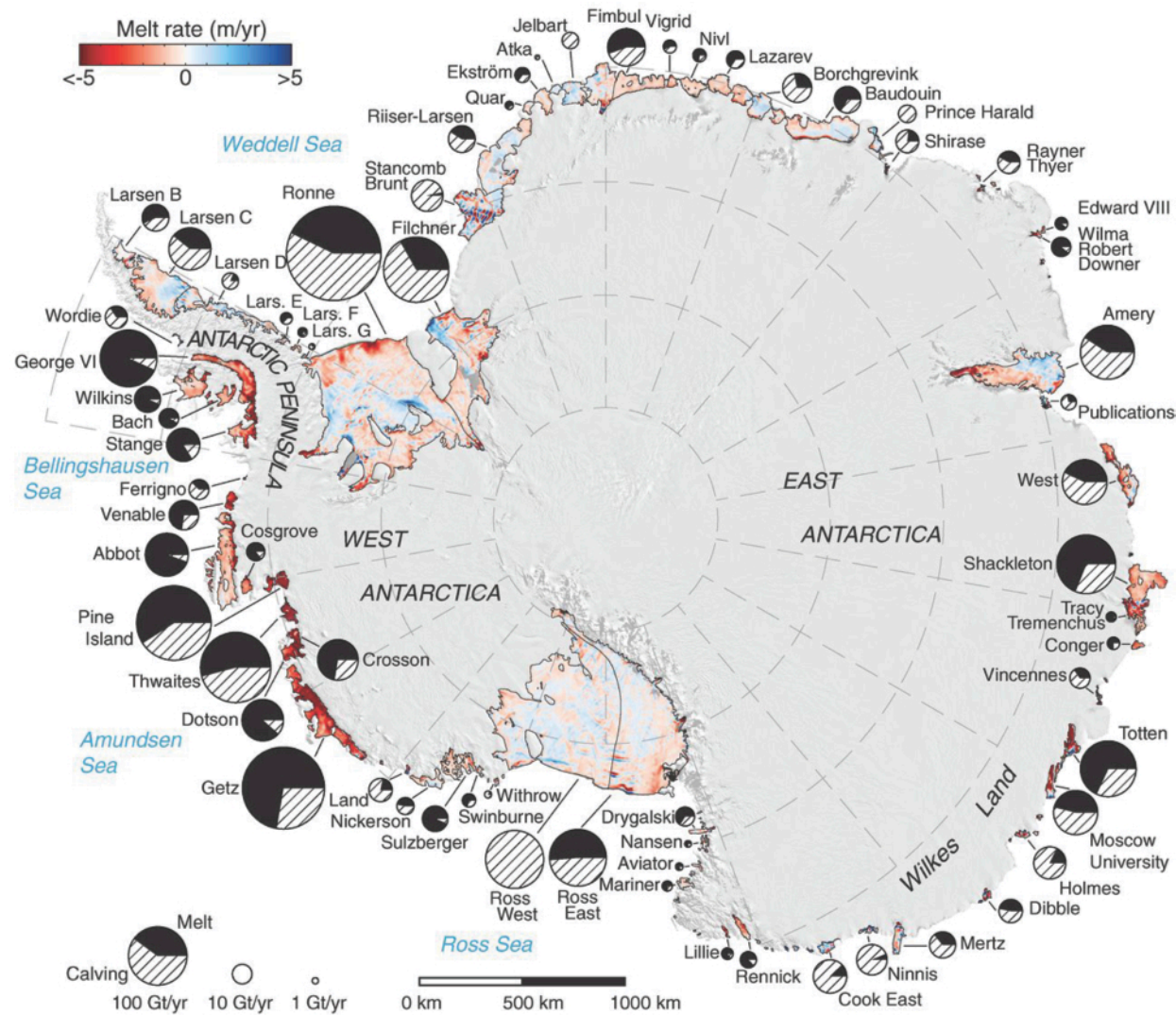


Representing calving and iceberg dynamics in global climate models

Olga Sergienko
CICS/GFDL

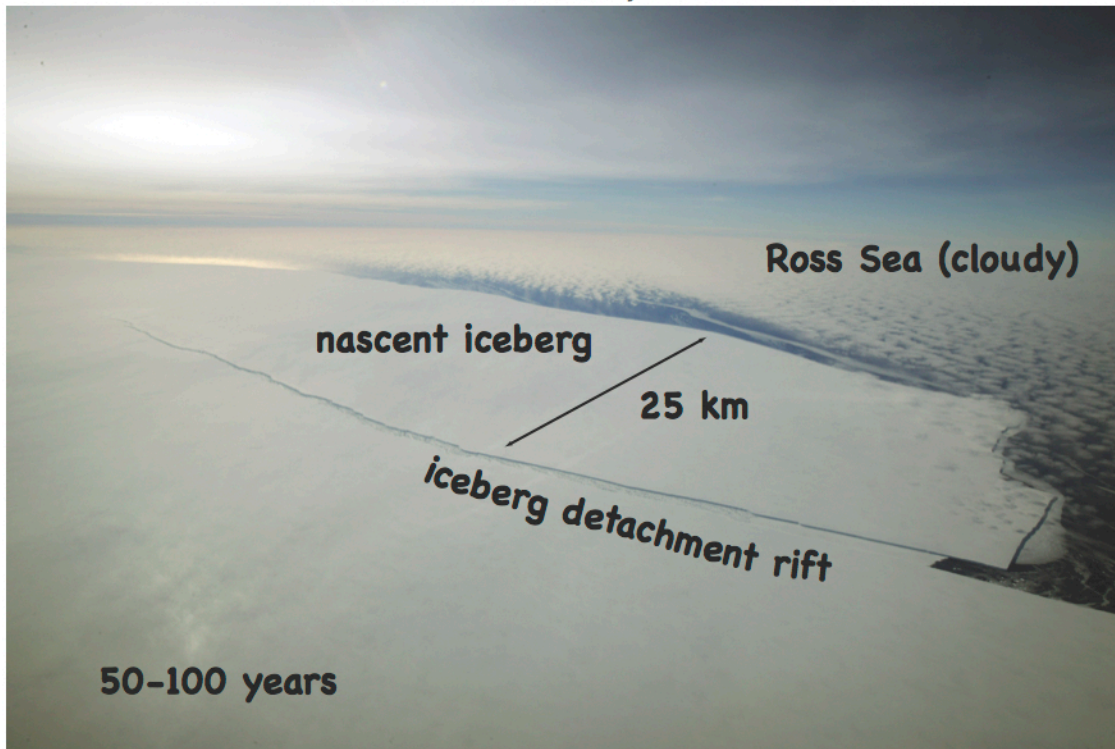
Antarctic mass loss



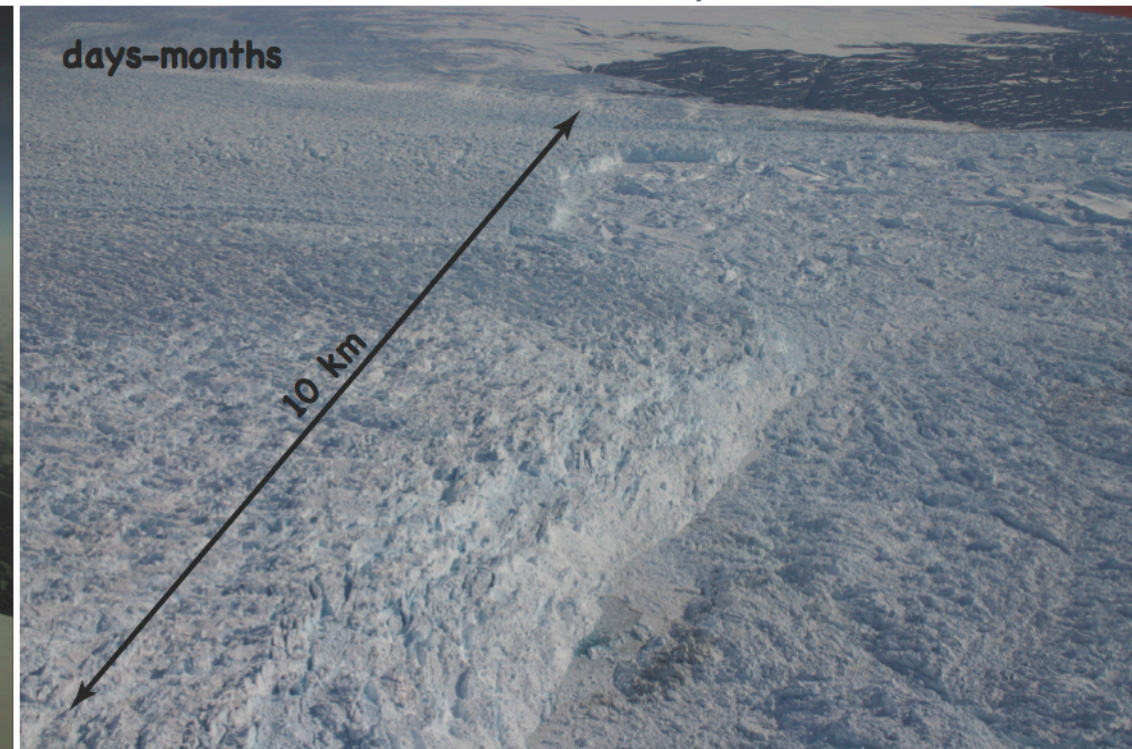
Melting: 45% Calving: 55%

Calving and icebergs

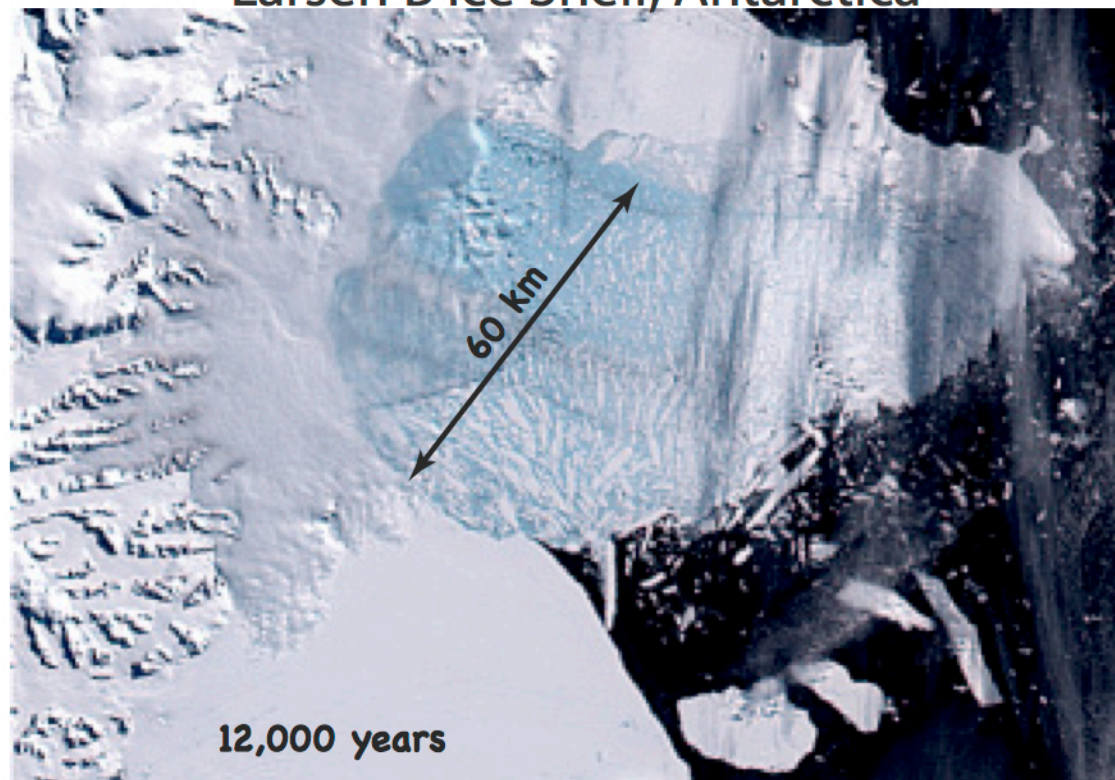
Ross Ice Shelf, Antarctica



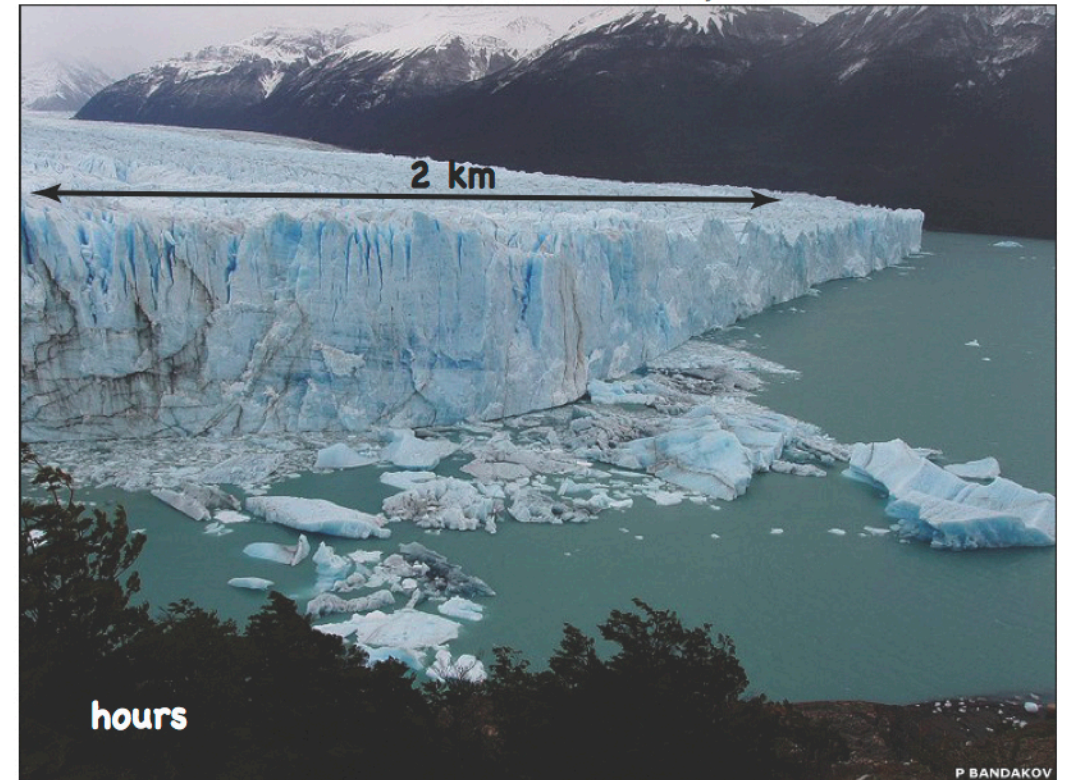
Jakovshavn Isbræ, Greenland



Larsen B Ice Shelf, Antarctica



Columbia Glacier, Alaska



Why is there no “calving law”?

spatial scales

1mm-10 cm

grain size
start cracks

1m -1 km

fractures
rifts, ice bits

10 km-1,000 km

tabular icebergs
ice shelves

temporal scales

1sec-1 min

crack propagation

hours-days -seasons

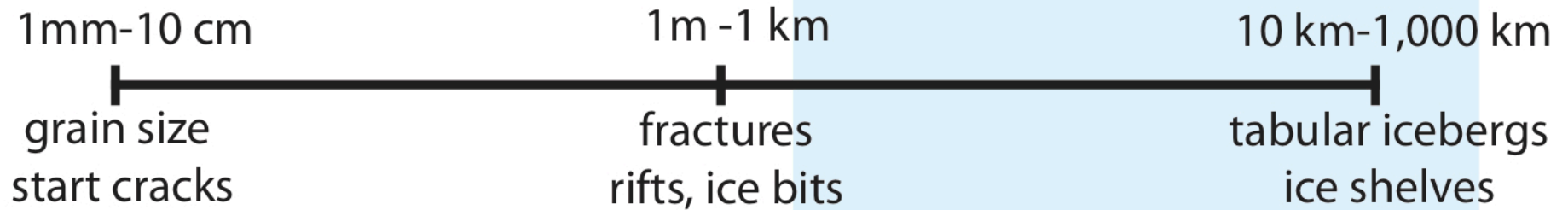
tide-water calving
duration of collapse

100 yrs-10,000 yrs

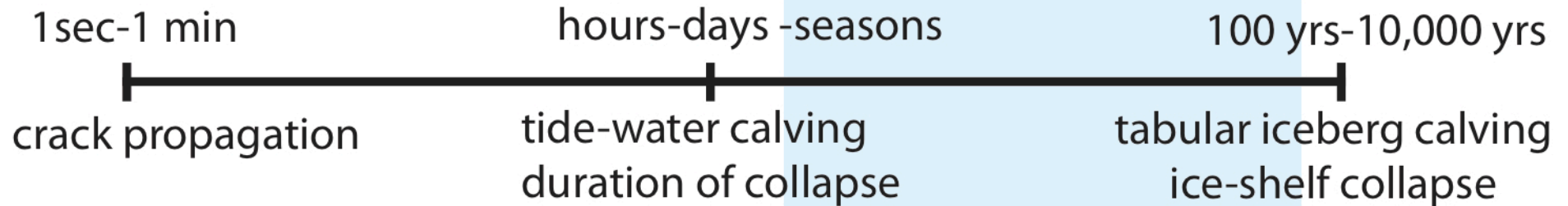
tabular iceberg calving
ice-shelf collapse

This project

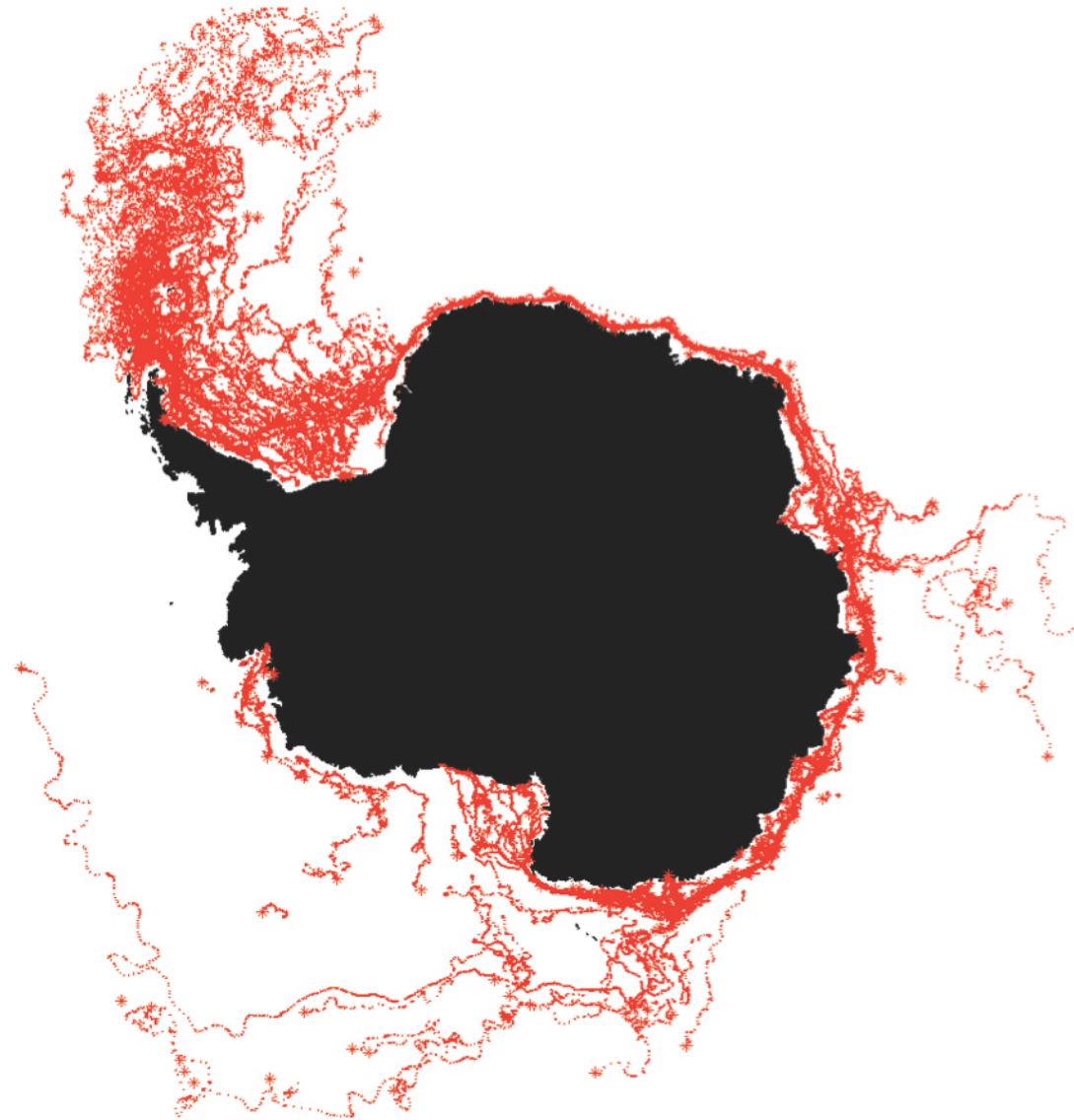
spatial scales



temporal scales



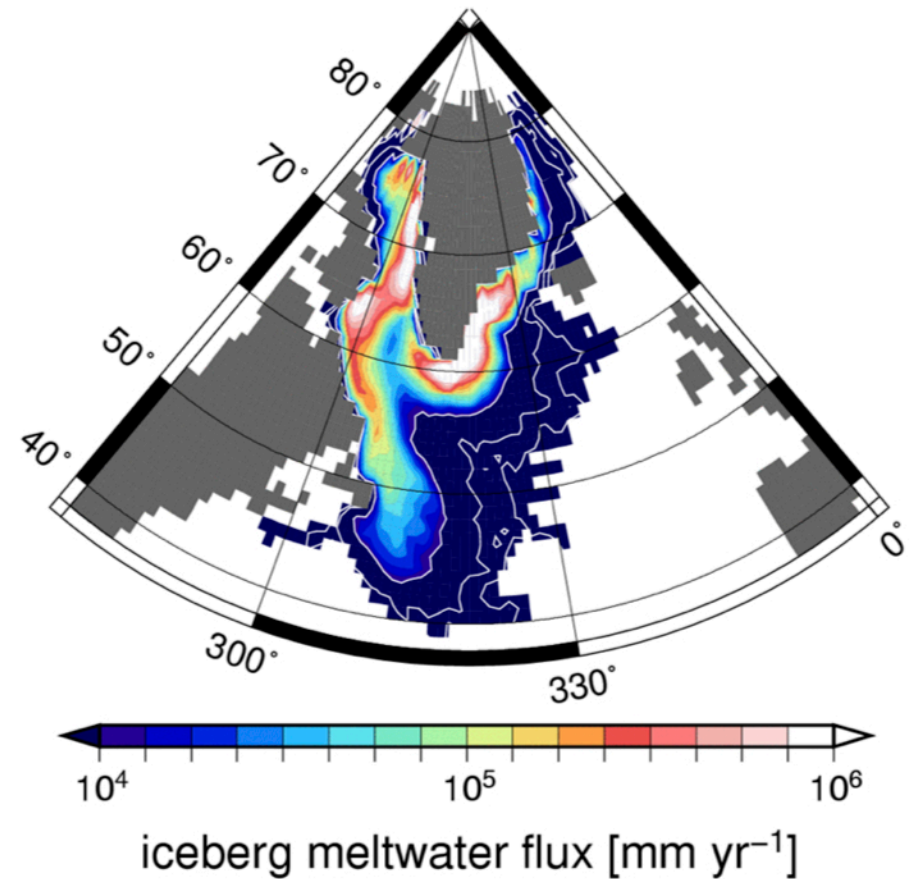
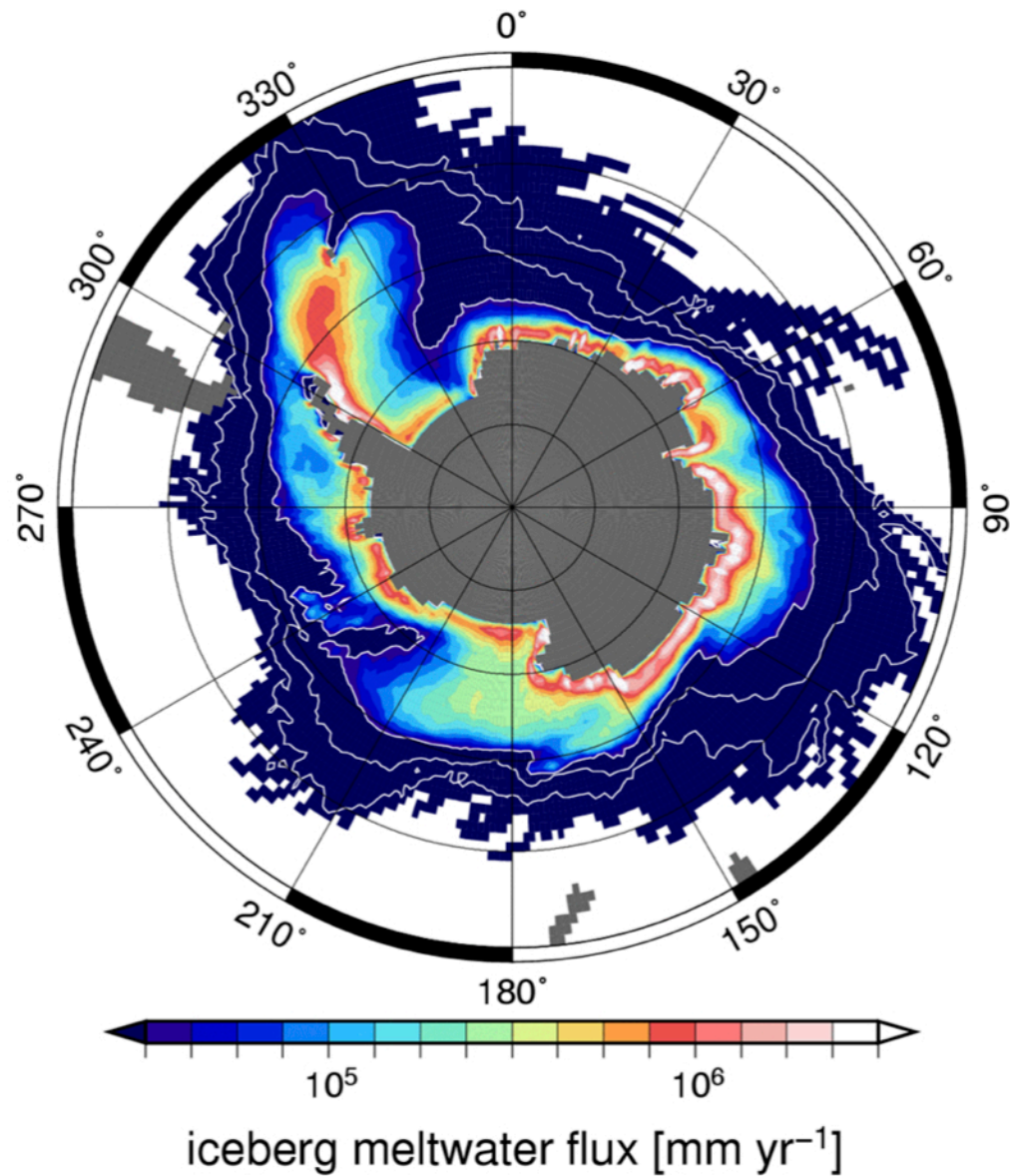
Iceberg tracks (1999-2010)



icebergs $> 5 \text{ km} \times 2 \text{ km}$

the most southern Jan 7, 2014: $\sim 45^\circ \text{ S } 6^\circ \text{ W}$

Iceberg representaion in the GFDL climate model



We plan to do

- Calving parameterizations
- Iceberg-ocean interactions
- Compile available data